IN THE CLAIMS

1. A power supply, comprising:

an AC-power input;

a DC-power output;

an inverter for variably delivering more or less power to the DC-power output from the AC-power input that is dependent on a single control signal input;

a sampler connected to sense the instantaneous voltage at the AC-power input;

a feedback loop connected to sense the average of at least one of voltage, current, or power at the DC-power output; and

a multi-mode controller connected to receive weighted signals from the sampler and the feedback loop, and providing for a combination applied to said single-control signal input of the inverter that simultaneously corrects input power factor and regulates the DC-power output.

2. The power supply of claim 1, further comprising:

an input rectifier connected to the AC-power input and for providing a full-wave rectified voltage waveform to the sampler.

3. The power supply of claim 1, wherein:

the inverter has an output frequency dependent on a capacitor and a combination of first through third currents driven into said capacitor through respective first through third weighting resistors, wherein a resulting frequency output drives switches included in the inverter.

4. The power supply of claim 1, wherein:

the inverter has an output frequency dependent on a capacitor and a combination of first through third currents driven into said capacitor through respective first through third weighting resistors, wherein the sampler provides a sample of said instantaneous voltage at the AC-power input to said first weighting resistor, and said feedback loop provides part of said average voltage at the DC-power output to said second weighting resistor;

wherein, a frequency output is dependent on both said instantaneous voltage at the AC-power input and said average voltage at the DC-power output.

5. A power supply, comprising:

a first circuit for input-sampling an AC-power input to a power supply to detect an AC voltage-input waveform;

a second circuit for output-sampling a regulated DC-power output of said power supply;

a third circuit for combining samples taken from said AC voltage-input waveform and said regulated DC-power output into a single control signal; and

a fourth circuit for operating a single power conversion stage with said single control signal to regulate its output according to a weighted combination of the instantaneous AC-voltage present at said AC-power input and an average DC-voltage present of said DC-power output.

6. A method of operating a power supply, the method comprising the steps of:

input-sampling an AC-power input to a power supply to detect an AC voltage-input waveform;

output-sampling a regulated DC-power output of said power supply;

combining samples taken from said AC voltage-input waveform and said regulated DC-power output into a single control signal; and

operating a single power conversion stage with said single control signal to regulate its output according to a weighted combination of the instantaneous AC-voltage present at said AC-power input and an average DC-voltage present of said DC-power output.

7. A power supply, comprising:

an AC-power input;

a DC-power output;

an inverter for delivering a variable amount of power to the DC-power output from the AC-power input and that is dependent on a first and a second control signal input;

a sampler connected to sense an instantaneous voltage at the AC-power input, and for providing said first control signal input;

a feedback loop connected to sense at least one of an average voltage, current, and power at the DC-power output, and for providing said second control signal input; and

a multi-mode controller connected to receive signals from the sampler and the feedback loop, such that one is used primarily to correct an input power factor,

and the second control signal is used primarily to regulate the DC-power output.

8. A power supply, comprising:

an AC-power input;

a DC-power output;

an inverter for variably delivering more or less power to the DC-power output from the AC-power input that is dependent on two control signal inputs;

a sampler connected to sense the instantaneous voltage at the AC-power input;

a feedback loop connected to sense the average voltage, current, or power at the DC-power output; and

a multi-mode controller connected to receive the two signals from the sampler and the feedback loop, such that one control signal primarily corrects input power factor by instantaneously varying the frequency of the inverter and the second control signal primarily regulates the DC-power output by controlling the average frequency of the inverter.

9. The power supply of claim 8, wherein the multi-mode controller controls said power factor by instantaneously varying a pulse width and regulates the DC-power output by controlling an average pulse width.

10. The power supply of claim 8, wherein the multi-mode controller controls said power factor by instantaneously varying a pulse width and regulates the DC-power output by controlling an average frequency.

11. The power supply of claim 8, wherein the multi-mode controller controls said power factor by instantaneously varying a frequency and regulates the DC-power output by controlling an average pulse width.